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The purpose of this study was to explore the possibility of developing a valid and reliable testing instrument to evaluate the volleyball forearm bounce pass as it is used in a game-like situation of serve reception. The study was based upon data collected from 100 skilled high school female volleyball players from Louisiana during the fall of 1975.

A skill test was devised to measure the player's ability to receive a serve and pass the volleyball to the center front court position. The players were tested in left, center, and right back court positions.

Reliability of the test was determined by using the analysis of variance repeated measures design. The reliability was established at .19.

Validity was determined by correlating the total skill test scores with the subjective ratings of three qualified judges. The judges rated each subject on ten serve receptions during game play. The Pearson Product-Moment Method was the statistical technique employed. The validity was established at .20.

Within the limits of this study, it was concluded that the proposed forearm skill test was not a valid and reliable measure of the forearm bounce passing ability of skilled high school volleyball players.

EXPLORATION OF THE DEVELOPMENT OF AN INSTRUMENT TO EVALUATE THE VOLLEYBALL FOREARM BOUNCE PASS UTILIZING SERVE RECEPTION

by

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APPROVAL PAGE

This thesis has been approved by the following committee of the Faculty of the Graduate School at the University of North Carolina at Greensboro.

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CHAPTER I

INTRODUCTION

The game of volleyball has undergone many changes since its origin in 1895 at the Y.M.C.A. in Holyoke, Massachusetts. William G. Morgan invented the game to provide a form of indoor recreation for businessmen that was of a less strenuous nature than the popular game of basketball. Originally the game was called "Minonette". It was changed to "Volleyball" by Dr. Halstead of Springfield, Massachusetts because the basic idea of the game was to volley the ball back and forth over the net (Baacke, 1975).

Initially a tennis net elevated to a height of 6'6" was utilized to bat a rubber bladder of a basketball across the net. Since then major changes have occurred causing this recreational game to evolve into an exciting and challenging sport demanding much athletic finesse. At present, volleyball is one of the most popular sports in the world. Results of a survey taken by the International Olympic Committee in 1970 indicated that there were approximately 65 million registered players in both volleyball and basketball (Baacke,1975).

The inclusion of volleyball in the Olympic Games in 1964 gave impetus for many of the recent changes that are evident in the sport of power volleyball today. Thigpen (1967) stated the following:

> Power volleyball is composed of definite, planned and strategic offensive and defensive patterns. In short, power volleyball is volleyball played with more strategy, more advanced techniques, more color and skill--more "power" than is observed in most volleyball games. (p. 4)

One of the major changes has been in the skill used for serve reception. No longer is the traditional overhead pass used to receive the serve. The forearm pass, commonly known as the bump, proved more effective in handling the ball and provided less risk of being penalized for an illegal hit. An additional benefit of the skill is that a player is able to cover a larger court area because he can leave his feet with a dive or roll to play balls which would have been considered unplayable in the past (Shondell & McManama, 1971). Scates (1972) reported that at recent U.S.V.B.A. and N.C.A.A. championships, approximately 99% of the serves were passed with the forearms.

Keller (1968) stated that the evolution of the forearm pass follows the evolution of the game of volleyball itself, from a passive exercise for unathletic businessmen to today's "power volleyball" featured in the Olympic Games. He

remarked that the pass is the foundation on which all other plays are built. Without total team competency in this skill the team is doomed to be a repetitive loser.

Research on evaluation of the forearm pass is limited in the published literature. There are few valid and reliable skill tests which accurately measure the pass. There is a need by physical educators and coaches to determine the degree of skill acquisition of their students and players. It is the hope of the author, that this study will produce such an instrument to effectively evaluate the forearm bounce pass.

Statement of the Problem

The purpose of this study is to explore the possibility of developing a valid and reliable testing instrument to evaluate the volleyball forearm bounce pass as it is used in a game-like situation of serve reception. The study will be based upon data collected from 100 skilled high school female volleyball players from Louisiana during the fall of 1975.

Definition of Terms

Skilled high school female volleyball players are members of high school varsity volleyball teams within the state of Louisiana.

Forearm bounce pass is a particular passing technique used in volleyball to contact balls at waist or below waist level. It is used almost exclusively in serve reception and to receive low spiked balls. Generally the pass is the first contact made and is used to direct a controlled ball to the setter who will in turn position the ball for the spiker. Common names for this type pass are bump, forearm pass, dig, and recovery shot.

Assumptions

1. The accuracy of the volleyball forearm bounce pass can be measured by a skill test which incorporates serve reception.
2. Receiving serves is more realistic to a game situation than receiving high tossed balls to measure the execution of the bump.
3. The volleyball forearm bounce pass is the primary skill used in serve reception.
4. Subjects participating in the study possess a high level of skill in volleyball.
5. The varsity players are skilled servers and provide a realistic game situation.

Scope of the Study

The study was limited to approximately 100 females participating on the varsity volleyball team of their

respective high schools. The teams selected were, in the investigator's opinion, the higher skilled teams in the state of Louisiana.

Significance of the Study

Literature findings revealed few skill tests which measure the forearm bounce pass. The examined tests used a high toss which is not typical of a game situation. Since the flight of the ball in game play is usually more horizontal in trajectory, a test measuring the receipt of such a ball would be more realistic and valid. The forearm bounce pass is used almost exclusively in serve reception. Therefore, it is serve reception that will be a vital part of measuring the accuracy of the forearm bounce pass.

It is hoped that this instrument will be useful to physical educators and coaches in evaluating their players' skill level in this fundamental technique. This instrument could provide information of strengths as well as weaknesses in the execution of the bump. The test could aid a coach in planning game strategy and in selecting the best positions for his players. An additional use could be as one screening device for coaches in the selection of their teams.

CHAPTER II

REVIEW OF LITERATURE

This research was an attempt to explore the possibility of developing a valid and reliable testing instrument to evaluate the volleyball forearm bounce pass. Following is a summarization of literature dealing with three areas vital to this research. These areas are (1) history of the forearm bounce pass, (2) description and functions of the forearm bounce pass, and (3) review of forearm bounce pass skill tests.

History of the Forearm Bounce Pass

The changes volleyball has undergone are many since its inception by William G. Morgan in 1895. Probably one of the most obvious changes is the absence of the overhand pass in serve reception. Welch (1967) gave an account of the history of the bump in the United States as dating back as far as 1946 in California. The California teams considered it illegal to hit a ball with both of the palms turned upward. Instead they used a form of the bump utilizing one closed fist or the heel of one hand. Since these teams began dominating the United States Volleyball

Association National Championships, their new techniques gradually influenced teams around the country.

The primary impact, however, came approximately during the 1964 Olympics when the American top players still used the traditional overhand pass for serve reception. These attempts proved futile since the international referees were calling strictly against most serve receptions using the chest pass. Many of the best foreign teams from Russia and Japan were bumping the ball successfully using their forearms. American coaches soon adopted the technique through necessity.

Scates (1972) stated that "At recent USVBA and NCAA championships, approximately 99 percent of the serves were passed with the forearms" (p. 276).

Keller (1970) made the following statements:

> The forearm pass at its inception was an emergency move, used only when a player could not play a ball in any other manner. Today it is considered an acceptable, controlled method of passing. It has gained such importance that a great amount of time is spent in training and practicing the skill when preparing a team for competition. (p. 5)

The function of the forearm bounce pass has evolved throughout the years into one of the most essential fundamentals necessary in the game of volleyball today.

Schurman (1974) considered the forearm bounce probably the most important of all volleyball skills. Without good passers, a team's entire offense will suffer.

Description and Function of the Forearm Bounce Pass

The forearm bounce passing technique utilized in serve reception involves anticipation of the flight of the ball in order to position the body in its path. The body position is regulated so that the ball is contacted above the waist. The knees are bent at a 90-degree angle having the feet perpendicular to the target area. There is a slight forward lean, but the back is kept relatively straight. The arms are flexed and the forearms are supinated to form a flat rebounding surface. The hand position varies depending on the preference of the player. The ball is contacted simultaneously about two to six inches above the wrists. The legs are extended and the arms are kept almost stationary rather than swinging them to meet the ball. There is a continuation of the follow-through by the upward extension of the legs and a slight upward motion of the arms (Keller, 1968; Scates, 1972; Schaafsma & Heck, 1971).

Today the forearm bounce pass is considered one of the fundamental skills of volleyball. Scates (1972)

stated that "The pass is the reception of the serve or first contact of the ball by the offense" (p. 31). The objective is to send the ball to the setter who will in turn position the ball for the attack. Volleyball experts agree that the forearm pass is the best method of recovering balls below the waist and receiving most serves (Egstrom, 1966; Schaafsma & Heck, 1971; Thigpen, 1967; Trotter, 1965; Welch, 1969).

The forearm bounce pass has advantages over the chest pass although many feel that greater accuracy is possible with the latter. With the bump pass the player has more time to follow and react to the ball since it is contacted later in the ball's trajectory. Also the player's range can be doubled by using the forearm bounce pass since the chest pass limits the useful range in all four directions (Keller, 1968). Probably the greatest attribute, however, is the prevention of illegal hits when handling the ball.

Keller (1968) separated the forearm pass into two general categories: (1) the pass, which is the reception of the serve or a "free ball" and, (2) the dig, which is the reception of a hard attack or spike. It is primarily with the pass in serve reception that this study will be concerned.

Review of Forearm Bounce Pass Skill Tests

Few skill tests were found which measure performance of the forearm bounce pass. The majority of existing tests measured the serve and the volley. Perhaps this is because the forearm bounce is relatively new to the game compared with other volleyball skills. A critique will be made on the following tests examined:

The American Association of Health, Physical Education and Recreation Passing Test. The Test Project Committee under Shay's direction published a battery of four tests as follows: (1) volleying, (2) serving, (3) setting, and (4) passing. The test did not state specifically which type of pass is to be used. It is the investigator's assumption that the test measures the forearm bounce pass. The purpose of the test is to measure a player's skill in passing a volleyball from the rear of the court toward the net. The passer stands in the center back position, receives a high throw from the tosser, and executes a pass that goes over an 8-foot rope and onto a marked area. There are two marked areas of 24 square feet located on the far left and right of the court three feet from the net. (Shay, 1969)

The main criticism of the investigator is that it is not game-like. The flight of the ball to the passer

in game play is usually more horizontal with a greater velocity than the high toss used in the skill test. Also, the target areas are located on the far left and right front areas. Generally the position taken by most setters is located in the center front position utilizing a four-two or six-six offensive system. In this way the setter is positioned to easily set to the left or right front spiker depending on the desired play chosen. The validity and reliability coefficients for the test were not reported.

Slaymaker and Brown Bump Test. The forearm bounce pass or bump is tested by using a flat wall, with no markings, as a rebounding surface. The player being tested must stand behind a six-foot restraining line facing the wall. As the starting command is given, the player tosses the ball in an underhand motion against the wall and continues with bump passes for 30 seconds. Any illegal hit or ball hit in front of the restraining line does not count. If an illegal hit occurs, the player must retrieve and retoss the ball to continue scoring. Each legal bump pass contacting the wall from a starting position behind the restraining line counts three points. (Slaymaker & Brown, 1970)

Norms were given for men and women, however, specifications on the sample size, age, and degree of skill

were not given. Also no validity or reliability coefficients were reported.

Another weakness is that no height restriction is used which is an important factor in good passes. It is in the opinion of the investigator that timing the passes discourages good form. The player is more likely to hit the ball with a more horizontal trajectory to insure a quicker rebound to obtain a higher score. This resulting pass would be more difficult for a setter to handle than would a pass with a higher trajectory.

Smith Bump Test. Smith's test measured the ability to pass the volleyball from the left back, center back, and right back court positions to the center front court using the forearm bounce pass. The subjects had to pass the ball over a ten-foot rope into a rectangular target area six feet by ten feet. The center of the target was four and one-half feet from the center court line and 15 feet from either side line. The test required a thrower to put the ball into play. The thrower was positioned in the center of the court one foot beyond the ten-foot line on a ladder one and one-half feet above the net. The ball was thrown using an overhand softball throw. Four trials at each court position were administered. Height and accuracy scores were totalled on each pass.

A ball passed over the ten-foot rope scored two points; if it touched the rope, the trial was repeated; and under the rope, it scored no points. A pass landing on or within the target area also scored two points. Illegally hit balls were given no point value. The reliability coefficient was .25. The validity coefficient established was .29 using judges' ratings as the criterion. (Smith, 1975)

The main criticism of the investigator is in the scoring system. The height and accuracy components of a pass probably should not be measured separately. The product of the trial should include both components. For example, a subject could bump the ball well above the ten-foot rope yet out of play and still receive the optimum point value on the height component.

Another criticism is that the test does not adequately discriminate passing ability. The target area used does not take into account other suitable passes in the left and right front areas which are likewise suitable positions for a setter to set the ball.

Throwing the volleyball in an overhand manner does simulate a serve more than a toss. It is not likely, however, that a receiver will be able to have full view of the server positioned one and one-half feet above the net.

Helmen's Bump to Self Test. A battery of skill tests was designed for college women by Helmen. The test was designed to measure the player's ability to control the forearm bounce pass within a 15' square area. Two separate trials of 30 seconds were administered in which the player attempted to bump the ball consecutively, into the air above a twelve-foot mark. At least one foot must remain in the 15' square area. The score was the largest consecutive number of legal passes of the first trial added to the largest consecutive number of passes in the second trial. The reliability was found to be .76 based on the test-retest method. A validity coefficient of .50 based on judges' ratings of general playing was obtained. (Helmen, 1971)

A weakness of this test is that it does not present a realistic game situation. Most forearm bounce passes are used to receive serves and pick up hard hit spikes with a horizontal trajectory. Obviously the trajectory involved in this test contains primarily the vertical element.

Bosben's Volleyball Bounce Test. A skill test was developed using a serving device consisting of a modification of a baseball pitching machine. Ten attempts, five from the right back court position and five from the left back court position, were given each subject. Three testing days were used giving each subject 30

attempts. The object of the test was to pass the pitched balls over a ten-foot rope and onto the floor target of two concentric circles using the forearm pass. A reliability of .55 was found. Content validity was claimed as the test met specifications of good performance as determined by authorities in the field of volleyball. The test has good merit. It seems, however, that the pitching machine is impractical since it would not be a common piece of equipment found in most school settings. Also the investigator questions the reason for not receiving balls in the center back court position since it is a primary serve reception position.

Summary

The forearm bounce pass is a relatively new volleyball skill. It is now recognized as an essential fundamental used in serve reception and passing hard hit spikes. A review of the literature revealed a scarcity of valid and reliable forearm bounce skill tests. A major criticism of the examined skill tests was that the tests were not game-like.

CHAPTER III

PROCEDURES

The purpose of this study was to explore the possibility of developing a valid and reliable testing instrument to evaluate the volleyball forearm bounce pass as it is used in a game-like situation of serve reception.

The subjects for this study consisted of 100 female volleyball players. They were enrolled in high schools within the state of Louisiana during the 1975-76 academic year.

A skill test was devised to measure the player's ability to receive a serve and pass the volleyball to the center front court position. The subjects were tested in the left, center, and right back court positions. The subjects were required to pass the ball over an eight-foot rope to the target area at the front of the court. The main target area at the center front court position received a point value of ten. The point value diminished as the pass deviated from this area.

The reliability of the test was determined by using the analysis of variance repeated measures design. Validity was determined by correlating the total skill test scores with the subjective ratings of three qualified judges.

The judges rated each subject on ten serve receptions during game play. The total of the three judges' ratings was used as the criterion for computing the correlation. The statistical technique employed was the Pearson Product-Moment Method.

Design of the Testing Instrument

Figure 1 illustrates the newly designed skill test. The designated scoring units were based on a review of the literature, suggestions from experts in the area of volleyball, and personal knowledge and experience in this area. The center front area is designated as the main target area receiving the highest score of ten. This is the primary passing target utilized by most high school teams using a basic 4-2 or 6-6 offensive system. This location allows the setter options in setting forward or backward to the front row spikers with little problem. The point values diminish as they deviate from the target area of ten. The test is game-like since each player is tested in all three back row positions and receives serves randomly from three different servers. Although the serving ability of different servers may vary, the serve is more characteristic of a game situation than is a high toss which possesses little velocity and horizontal flight. The test actively involves six students plus a recorder, scorer, retrievers, and a tester.

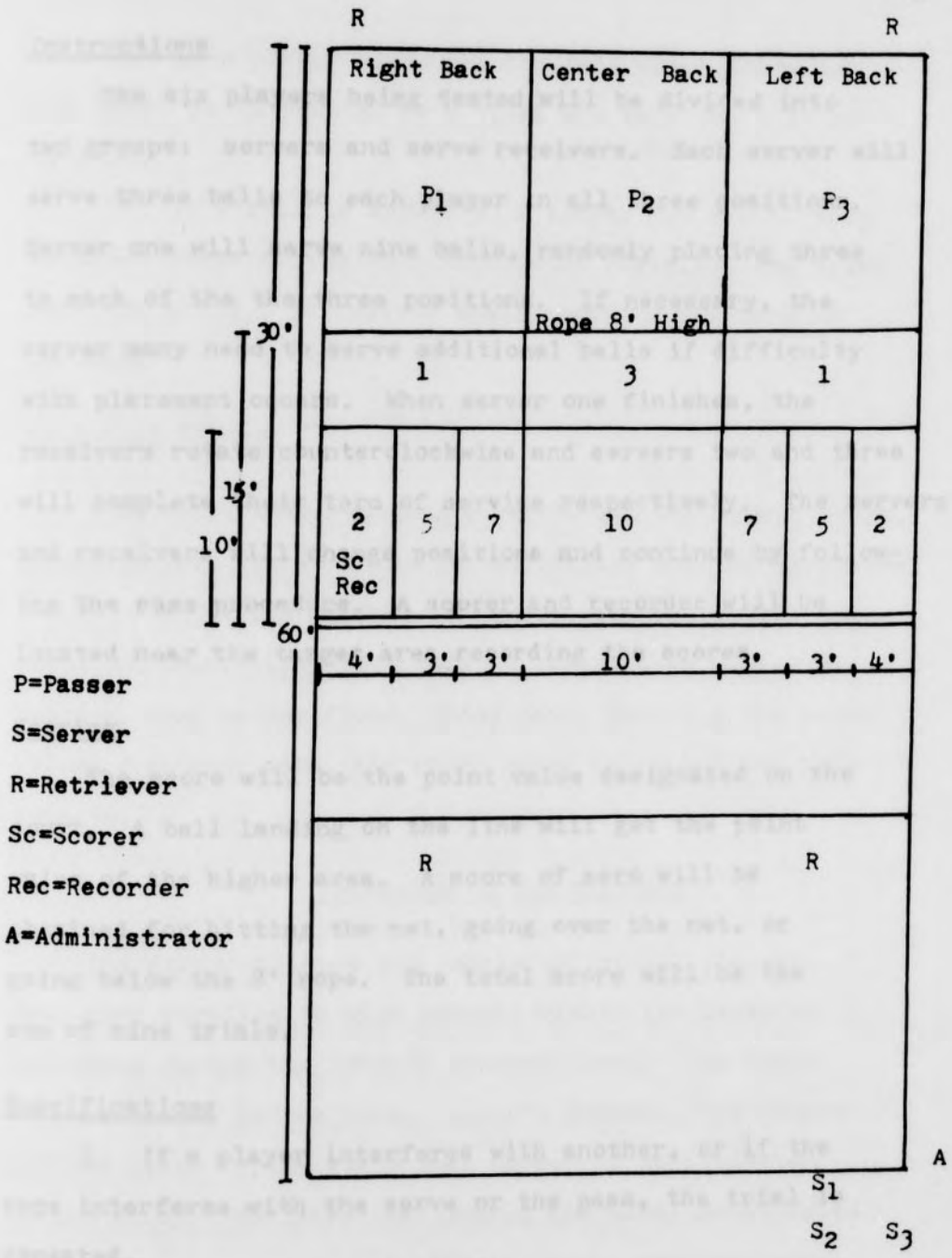

FIGURE 1

Diagram of the Forearm Bounce Pass Skill Test

Instructions

The six players being tested will be divided into two groups: servers and serve receivers. Each server will serve three balls to each player in all three positions. Server one will serve nine balls, randomly placing three to each of the the three positions. If necessary, the server many need to serve additional balls if difficulty with placement occurs. When server one finishes, the receivers rotate counterclockwise and servers two and three will complete their term of service respectively. The servers and receivers will change positions and continue by following the same procedure. A scorer and recorder will be located near the target area recording the scores.

Scoring

The score will be the point value designated on the court. A ball landing on the line will get the point value of the higher area. A score of zero will be obtained for hitting the net, going over the net, or going below the 8' rope. The total score will be the sum of nine trials.

Specifications

1. If a player interferes with another, or if the rope interferes with the serve or the pass, the trial is repeated.

2. If a player misjudges the ball which lands in his area, it is counted as a trial and receives a score of zero.

3. If a ball is served to a player who has already received three serves in a particular position, the trial does not count. The server shall continue his term of service.

Equipment Needed

The skill test requires a regulation volleyball court, approximately six volleyballs, volleyball net and standards, one rope or string 35 feet in length, two volleyball standards at least eight feet tall, a target area marked with masking tape on the floor, index cards denoting the point values for each area, and score cards to record the test results.

Selection of the Subjects

The study utilized 100 female volleyball players. They were enrolled in high schools within the state of Louisiana during the 1975-76 academic year. The teams selected were, in the investigator's opinion, the higher skilled teams in the state that agreed to participate in the study. The starting line-up and usual substitutes from each team were tested with the newly devised instrument.

Thirty coaches were contacted requesting permission to test their players. Appendix D and E illustrate the letter and reply card utilized. The majority of the teams contacted responded positively.

Procedure for Judging the Players

Selection of the Judges

Four judges were selected according to experience, interest, and availability. Each judge had both teaching and coaching experience in volleyball. Three judges were used for each game to increase reliability. Because of schedule conflicts and the large number of games involved in the study, it was impossible to use the same judges for each rating session. For this reason a board of four judges was trained in an organized rating session.

Construction of the Judges' Rating Scale

Appendix A depicts the scale used for the judges' ratings. Based on literature findings, a scale of five categories was chosen for the chart to allow for satisfactory discrimination. Advice from a number of experts in the area of volleyball was utilized in establishing the categories for the rating scale. Each category was carefully defined to differentiate various skill performances in the bump serve reception. Appendix B shows the rating chart used to rate the subjects.

Organisation of a Practice Rating Session

Prior to the practice session, the judges met to discuss the rating chart and procedures for rating. An attempt was made to reach an agreement on each of the categories.

The judges then met at a practice session with two teams in game play. Various serve receptions were scored aloud to establish an agreement for each of the five categories. The judges then individually rated the players. A comparison was made of the judges' scores to check for consistency in their ratings. When this was satisfactory, correlations were made between each of the judges based on their scores for five games. The correlations ranged from .88 to .96. This was considered to be high enough to use as a criterion for establishing validity.

Table 1

Coefficients of Judges' Ratings

Judge 1 with Judge 2	.88	Judge 2 with Judge 3	.95
Judge 1 with Judge 3	.93	Judge 2 with Judge 4	.95
Judge 1 with Judge 4	.96	Judge 3 with Judge 4	.96

Rating Sessions

Three judges from the board of four who were previously trained rated matches at tournaments throughout the volleyball season from September through November. Many times it was necessary to observe more than one match to acquire ten ratings on each player. The judges were seated near the middle on the sideline to insure good position for observation. The judges had ample time to obtain scores on both teams competing since only serve reception was being rated. The judges rated each player in serve reception until ten serves were received. The judges were able to rate most teams within two matches. The individual ratings by each judge for each player were totaled. The sum of the scores of each of the three judges was then totaled to compute the validity coefficient with the scores derived from the newly devised skill test.

Analysis of Data

The reliability was established using the analysis of variance technique using a repeated measures design. Validity was determined by correlating the subject's total skill test score with the subjective ratings in a game situation by three qualified judges utilizing the Pearson-Product Moment Method.

CHAPTER IV

DATA AND ANALYSIS

The purpose of the study was to explore the possibility of establishing an instrument to measure the forearm bounce pass in a reliable and valid manner. The reliability was established using the analysis of variance technique. Validity was determined by correlating the subjects's total skill test score with the subjective ratings of three qualified judges. The judges rated each subject on ten serve receptions during game play. The total of three judges' ratings was used as the criterion for computing the correlation. The Pearson Product-Moment Method was used to compute the validity coefficient.

Reliability of the Forearm Pass Skill Test

The reliability of the forearm bounce pass skill test was determined by the analysis of variance technique using a repeated measures design. A total of nine trials was given to each subject. Three trials in left, center, and right back court positions were administered as is typical in a game situation. The correlation coefficient established was .19. (See Table 2)

Table 2

Reliability and Validity of a Forearm Pass Skill Test

N=100

	Coefficient of Correlation
Reliability	.19
Validity	.20

Johnson and Nelson support the contention that in demonstrating reliability of a test, a coefficient of .80 is desired. (Johnson & Nelson, 1969) Garrett (1953) concluded that a test of physical ability must have a minimum reliability of at least .80 to be considered a reliable measure. (Garrett, 1953; Barrow & McGee, 1971)

Based on the forementioned information, the reliability coefficient of .19 established for the forearm bounce pass skill test can be designated as indicating a low relationship. The derived coefficient of .19 is not sufficient for the newly devised instrument to be considered reliable. A coefficient of at least .80 is usually desired. (Garrett, 1953; Johnson & Nelson, 1969)

Validity of the Forearm Pass Skill Test

The validity of the forearm bounce pass skill test was computed by correlating the total skill test scores and the total of three judges' ratings of 100 skilled female high school volleyball players in a game situation The judges rated each subject on ten serve receptions during game play. The statistical technique employed was the Pearson Product-Moment Method. A validity coefficient of .20 was derived for the skill test. (See Table 2)

Barrow and McGee (1971) state that a coefficient of at least .70 is necessary for a testing instrument to be considered valid.

Johnson and Nelson (1969) suggest the following table for use in the interpretation of relationships: (p.36)

$r = .00$	no relationship
$r = \pm.01$ to $\pm.20$	low relationship
$r = \pm.20$ to $\pm.50$	slight to fair relationship
$r = \pm.50$ to $\pm.70$	substantial relationship
$r = \pm.70$ to $\pm.99$	high relationship
$r = \pm1.00$	perfect relationship

Accepting Johnson and Nelson's interpretation, the obtained validity coefficient is considered to indicate a low relationship. The derived coefficient of .20 is not sufficient to be considered a valid instrument, since

a coefficient of at least .70 is usually desired. (Barrow & McGee, 1971)

Possible Factors Influencing the Outcome of the Study

1. The variability in the different servers was too great. Although most of the girls were good servers, some serves were more difficult to receive than others. While game-like, the serve reception had a direct influence on the receiving players' scores.

2. In order to test such a large number of subjects, the players were tested at various times during different tournaments. Varying degrees of fatigue could have been a limiting factor.

3. Judges rated players at different times during various tournaments. Varying degrees of fatigue could have been a factor in the ratings obtained on serve reception.

4. The number of trials administered in the skill test should perhaps be increased to raise the reliability.

5. Since the judges rated the subjects during game play, the strength or weakness of the opposing team was an important influencing factor on the ratings obtained by the subjects.

6. The fact that subjects were not alone when they were tested could have been limiting or motivating factors depending on the subject.

7. No practice trials were given before the new skill test was administered. Perhaps practice trials should be added to the procedures for administering the test.

8. Although the validity was low, the rating scale used by the judges had exceptionally high agreement in the preliminary testing. Subsequent use of this rating scale might be a viable method of assessing the forearm bounce pass.

9. The testing environment lacked many of the factors included in the game play such as: game pressure, strengths and weaknesses of opponents, fatigue, game environment, and other motivational factors.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The purpose of this study was to explore the possibility of developing a valid and reliable testing instrument to evaluate the volleyball forearm bounce pass as it is used in a game-like situation for serve reception. The study was based upon data collected from 100 skilled high school female volleyball players in Louisiana during the 1975 fall volleyball season.

The reliability of the forearm bounce pass skill test was determined by the analysis of variance using a repeated measures design. Three trials in left, center, and right back court positions were administered as is typical of the receiving positions in a game situation. The correlation coefficient established was .19.

The validity of the forearm bounce pass skill test was computed by correlating the total skill test scores and the total of three judges' ratings of 100 skilled female high school volleyball players in a game situation. The judges rated each subject on ten serve receptions during game play. The Pearson Product-Moment was

the statistical technique employed to compute the correlation. A validity coefficient of .20 was derived for the skill test.

Conclusions

The conclusions of this study were as follows:

1. The reliability coefficient of .19 established for the forearm bounce pass skill test indicated that the skill test was not a reliable measure of the forearm bounce passing ability of skilled high school female volleyball players.

2. The validity coefficient of .20 established for the forearm bounce pass skill test indicated that it was not a valid measure of the forearm bounce passing ability of skilled high school female volleyball players.

Discussion

Having produced a low degree of reliability and validity, the new skill test is not considered a good measurement of the forearm bounce passing ability of skilled high school female volleyball players using serve reception. It does not meet the standards set by authorities in the field of testing. (Barrow & McGee, 1971; Garrett, 1953; Johnson & Nelson, 1969)

The investigator does feel, however, that the test is a good practice drill to aid in learning the skill. It provides a specific goal for attainment as well as immediate feedback of results. It enables the student to understand the goal for the forearm bounce pass as it applies in a game situation to attain a higher score than previously attained or to attain a score higher than other class members. It serves as a motivational device in practice. The results are also helpful and informative to the teacher or coach in diagnosing weaknesses and strengths in their students' performance of this particular skill.

Recommendations for Further Study

The following recommendations are suggested based on the findings of this study:

1. Replicate this study increasing the number of trials administered in the skill test.

2. Construct variations of this forearm bounce pass skill test and statistically analyze them to determine validity and reliability.

3. Change the scoring scale so that the range of scores for both the skill test and judges rating is equally discriminating.

4. Repeat the study using a method of controlling the variability of the different servers.

5. Test teams using the forearm bounce pass skill test, and measure the relationship between the test results and team success.

6. Place a player in the center front position to serve as a visual target as in a game situation.

7. Extend the target beyond the net to give some point value for passes which just slightly miss the target area.

8. Do further study in establishing reliability and validity for the judges' rating scale.

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APPENDIX A

JUDGES' RATING SCALE

Rating Categories

Excellent	4 Points
Good	3 Points
Average	2 Points
Poor	1 Point
Failure	0 Points

Definitions of Each Category

Excellent-4 Points

The pass is bumped perfectly to the center front position. The height of the ball is clearly above the net

Good-3 Points

The pass is bumped slightly to either side of the center front position. The height of the ball is clearly above the net.

Average-2 Points

The pass is bumped to the left or right front area within ten feet of the net. The height of the ball is clearly above the net. The ball is hit one to two feet behind the 10' line and is clearly above the height of the net.

Poor-1 Point

The pass is bumped anywhere in the back court area behind the 10-foot line which is playable; the pass is any bump which is below net height but is still playable; the pass is hit out of bounds but is still playable.

Failure-0 Points

The pass is bumped resulting in a point for the opposition or a side out for one's own team; the pass is not playable; the ball is passed over the net.

APPENDIX B

JUDGES' RATING CHART

School _____

Date _____

Serve Reception Trials

Name	#	1	2	3	4	5	6	7	8	9	10	Total

APPENDIX C

SKILL TEST SCORE CARD

School _____

Date _____

		TRIALS									
Name	#	1	2	3	4	5	6	7	8	9	total
		RB			CB			LB			
		CB			LB			RB			
		LB			RB			CB			
		RB			CB			LB			
		CB			LB			RB			
		LB			RB			CB			

APPENDIX D

LETTER SENT TO COACHES REQUESTING PERMISSION TO TEST THEIR PLAYERS

Dear Coach:

I am presently working on my master's degree at the University of North Carolina at Greensboro. I am in the process of conducting a study in the area of volleyball. My study involves the development of an instrument to measure the forearm bounce pass and requires a sample of at least 100 skilled female volleyball players.

I am writing to ask your cooperation in testing your volleyball players at a time of your convenience. Please mail the enclosed post card as soon as possible, since I must complete my testing within the volleyball season.

Your cooperation and assistance is greatly appreciated.

Sincerely,

Kathy Trosclair

Kathy Trosclair

APPENDIX E

CONSENT CARD SUBMITTED TO COACHES

Coach's Name_____

School _____

_____ Yes, you have my permission to test my players. Please contact me to arrange for a testing date.

_____ No, I am unable to participate in your study.

******** Please list tournaments in which your team is participating, including the dates and locations. Perhaps this would be a convenient time to test a number of teams in your area. Thank you!

APPENDIX F

DATA SHEET FOR JUDGES' RATINGS

Subject	Judge No. 1	Judge No. 2	Judge No. 3	Judge No. 4	Total of Judges' Ratings
1		15	8	9	32
2		24	20	23	67
3		10	9	10	29
4		18	20	21	59
5		10	12	10	32
6		15	18	18	51
7		17	16	16	49
8		17	15	17	49
9		9	8	7	24
10		9	7	9	25
11		20	22	20	62
12		10	10	12	32
13	3	3		3	9
14	8	7		8	23
15	7	9		7	23
16	14	10		14	38
17	8	8		7	23
18	11	9		9	29
19	5		3	4	12
20	12		15	11	38
21	20		20	20	60
22	13		13	13	39
23	29		26	27	82
24	17		16	17	50
25		4	4	4	12
26		0	0	0	0
27		12	14	14	40
28		7	7	7	21
29		0	0	0	0
30		4	2	2	8
31		10	11	8	29
32		3	2	2	7
33		9	8	9	26

DATA SHEET FOR JUDGES' RATINGS

Subject	Judge No. 1	Judge No. 2	Judge No. 3	Judge No. 4	Total of Judges' Ratings
34		12	15	17	44
35		16	17	15	48
36		10	10	8	28
37		8	7	6	21
38		4	4	4	12
39		9	5	7	21
40		11	11	12	34
41		8	8	8	24
42		13	13	15	41
43		10	7	9	26
44		15	10	8	33
45		10	10	12	32
46		15	13	12	40
47		7	6	7	20
48		7	8	6	21
49	1	1		2	4
50	0	0		0	0
51	12	12		13	37
52	7	9		9	25
53	14	12		14	40
54	17	17		17	51
55	10	10		10	30
56	3	3		4	10
57	16	17		17	50
58	9	9		9	27
59	20	22		22	64
60	10	10		11	31
61	10	9		10	29
62		24	24	22	70
63		15	10	12	35
64		21	17	20	58
65		11	13	13	37
66		10	11	10	31

DATA SHEET FOR JUDGES' RATINGS

Subject	Judge No. 1	Judge No. 2	Judge No. 3	Judge No. 4	Total of Judges' Ratings
67		26	25	26	76
68	12	11		11	34
69	16	14		13	43
70	3	4		5	12
71	3	3		4	10
72	10	9		9	28
73	6	5		6	17
74	23	24	27		74
75	13	14	14		41
76	15	18	16		49
77	28	30	30		88
78	18	18	16		52
79	25	23	23		71
80	25	22	23		70
81	25	25	23		73
82	9	9	9		27
83	20	23	19		62
84	17	18	18		53
85	14	13	13		40
86	7	5	5		17
87	4	4	3		11
88	13	15	15		43
89	0	0	0		0
90		15	16	16	47
91		10	10	9	29
92		17	16	16	49
93		9	11	10	30
94		16	16	18	50
95		16	16	18	50
96	9		10	9	28
97	12		12	12	36
98	5		6	7	18
99	21		17	19	57
100	14		11	12	37

APPENDIX G

DATA SHEET FOR SKILL TEST SCORES

Subject	Trials									Total Skill
	1	2	3	4	5	6	7	8	9	Test Scores
1	0	0	10	0	2	0	0	0	0	12
2	0	0	0	7	2	0	5	0	10	24
3	0	0	10	0	5	10	0	0	0	25
4	0	5	0	0	7	1	0	0	0	13
5	7	0	0	10	0	0	0	0	1	18
6	0	0	0	0	10	0	7	10	0	27
7	0	10	0	1	0	0	0	0	2	13
8	0	0	0	0	0	10	0	5	7	22
9	0	0	0	0	0	7	10	2	1	20
10	0	0	0	0	10	0	0	0	0	10
11	0	0	2	0	0	10	0	0	0	12
12	0	0	0	2	7	10	0	0	0	19
13	0	0	7	7	0	0	10	0	0	24
14	0	0	0	0	0	0	0	0	0	0
15	0	3	3	7	0	0	10	0	3	26
16	0	0	7	0	10	0	5	7	0	29
17	7	0	0	0	0	10	0	10	0	27
18	0	0	0	0	0	1	0	0	0	1
19	0	0	3	7	10	2	0	7	0	29
20	2	10	0	1	0	0	0	0	0	13

DATA SHEET FOR SKILL TEST SCORES

Subject	Trials									Total Skill
	1	2	3	4	5	6	7	8	9	Test Scores
21	7	10	2	0	10	3	0	0	0	32
22	0	0	0	2	10	0	1	0	5	18
23	0	0	10	7	10	0	0	0	10	37
24	0	0	7	1	0	0	0	10	0	18
25	0	0	0	0	2	3	10	10	10	35
26	0	0	0	0	0	0	0	5	0	5
27	0	7	7	7	0	0	7	7	0	35
28	0	0	10	0	5	0	0	0	0	15
29	1	0	0	0	0	7	0	0	7	15
30	0	0	10	1	0	0	0	0	0	11
31	1	0	7	2	0	0	10	2	10	32
32	10	0	3	0	3	0	0	0	0	16
33	5	0	0	10	10	7	0	7	0	39
34	0	0	2	7	0	7	0	7	0	23
35	10	0	0	10	0	0	0	0	0	20
36	0	0	10	7	0	10	0	0	7	34
37	0	7	1	0	0	0	1	0	1	10
38	0	5	7	7	10	0	10	0	10	49
39	7	0	0	0	0	0	3	7	5	22
40	0	0	0	0	0	0	0	7	7	14

DATA SHEET FOR SKILL TEST SCORES

Subject	Trials									Total Skill
	1	2	3	4	5	6	7	8	9	Test Scores
41	0	0	0	10	10	1	10	0	0	31
42	10	10	7	0	0	10	0	0	10	47
43	10	7	0	0	0	3	7	1	0	28
44	0	0	0	10	10	10	2	0	0	32
45	0	0	0	0	3	0	0	3	0	6
46	0	10	0	0	2	0	10	0	0	22
47	0	5	0	0	0	10	0	2	0	17
48	0	10	5	0	0	0	0	0	0	15
49	0	0	0	0	2	0	0	10	0	12
50	0	0	0	0	10	0	0	5	0	15
51	0	0	2	5	0	1	0	0	2	10
52	5	0	7	7	3	0	0	0	0	22
53	7	0	0	0	1	0	0	0	0	8
54	5	0	0	0	2	2	10	0	0	19
55	10	3	0	0	0	0	0	0	0	13
56	7	0	0	0	0	0	0	0	0	7
57	7	0	2	0	0	0	5	0	5	19
58	0	7	3	0	0	0	0	5	0	15
59	5	0	0	7	0	2	5	0	10	29
60	0	0	0	0	0	0	0	0	0	0

DATA SHEET FOR SKILL TEST SCORES

Subject	Trials									Total Skill
	1	2	3	4	5	6	7	8	9	Test Scores
61	7	1	2	0	0	0	0	0	0	10
62	10	10	0	0	2	0	0	0	0	22
63	0	0	10	3	7	1	3	0	0	24
64	0	0	3	0	0	0	0	0	0	3
65	2	10	10	0	10	0	0	10	0	42
66	2	0	0	0	0	0	0	0	0	2
67	0	0	0	0	10	0	10	0	0	20
68	0	0	0	0	3	10	1	7	0	21
69	0	10	10	0	10	0	10	10	0	50
70	0	3	0	5	1	0	0	2	0	11
71	0	0	0	0	7	0	0	0	0	7
72	0	0	0	0	0	0	0	10	0	10
73	0	0	0	0	0	0	10	0	0	10
74	0	10	10	0	3	0	0	5	0	28
75	0	0	0	10	1	0	0	0	0	11
76	0	1	0	6	0	0	10	0	0	17
77	5	0	0	10	0	0	0	0	10	25
78	10	10	0	0	0	6	1	0	6	33
79	0	3	0	0	5	0	0	7	0	15
80	0	0	0	5	2	10	0	7	0	24

DATA SHEET FOR SKILL TEST SCORES

Subject	Trials									Total Skill
	1	2	3	4	5	6	7	8	9	Test Scores
81	0	0	0	0	0	7	0	10	10	27
82	0	0	7	0	0	7	0	0	0	14
83	0	0	0	0	0	10	10	0	0	20
84	0	2	0	0	0	0	0	0	0	2
85	2	0	10	0	7	7	10	7	7	50
86	10	0	0	10	0	0	7	0	10	37
87	0	0	0	10	0	0	0	0	0	10
88	10	0	5	7	0	10	10	7	10	59
89	7	2	10	0	7	3	0	7	0	36
90	0	7	0	2	0	5	1	0	5	20
91	0	0	0	5	0	7	0	2	1	15
92	0	5	7	0	10	0	2	0	0	24
93	2	0	1	5	0	0	10	0	0	18
94	2	5	1	5	7	3	0	5	0	28
95	10	0	0	7	2	0	5	0	0	24
96	0	0	2	5	0	0	0	3	0	10
97	10	0	0	5	7	2	5	1	0	30
98	0	0	0	5	0	0	1	0	0	6
99	0	10	10	0	0	5	10	0	3	38
100	0	5	3	0	2	10	3	0	1	24